

INCREASING REQUESTS BY ADULTS WITH DEVELOPMENTAL DISABILITIES USING INCIDENTAL TEACHING BY PEERS

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A peer-delivered incidental-teaching procedure was used to instruct appropriate requesting in adults with moderate to severe mental retardation or autism. Three pairs of group-home residents participated in an incidental-teaching procedure to increase appropriate requesting, prompting, and responding of residents during lunch-preparation sessions. An increase in the number of incidental-teaching episodes during dinner was obtained, and remained high when lunch-making training sessions were withdrawn. In addition, during the incidental-teaching phase, an increase in appropriate requests and overall verbalizations occurred for the peer learners. Changes in appropriate requesting and overall verbalizations also remained higher than baseline when training was withdrawn.

DESCRIPTORS: incidental teaching, developmental disabilities, peer teaching

Research has shown that incidental teaching can be used successfully to improve language skills (Hart & Risley, 1968, 1974, 1975). This method involves initially setting up the environment with many reinforcing stimuli. Initiations by the learner to those reinforcing stimuli or activities are occasionally briefly blocked until the occasioned response, typically a verbal or social behavior, is emitted. Learners receive contingent immediate reinforcement consisting, at minimum, of the item towards which they had just initiated or a positive interaction with the teacher.

Because incidental teaching is incorporated in natural, ongoing situations to teach a particular skill, it may also support a wider range of behaviors. For example, both language and other social skills have been improved by incidental teaching in children and adolescents with developmental disabilities (e.g., McGee, 1988; McGee, Krantz, Mason, & McClannahan, 1983; McGee, Krantz, & McClannahan, 1985). McGee et al. (1983) increased the receptive language skills of 2 youths with severe language delays using this technique.

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Newly acquired language skills generalized to settings and activities other than those used in the initial teaching settings. Incidental teaching resulted in increases in the rate of appropriate verbalizations during both the course of the program and generalization assessments across settings. Similar results have been found in teaching children with language deficits (Gobbi, Cipani, Hudson, & Lapenta-Neudeck, 1986) and Head Start preschoolers (Hart & Risley, 1980).

Research with younger children with developmental disabilities has suggested that peer-to-peer teaching may be quite effective for teaching language and social skills (e.g., Girolametto, 1988; Kohler, Strain, Maretsky, & DeCasare, 1990; McHale, 1983). Recently, several researchers have combined peer-to-peer teaching with incidental teaching to produce positive changes in both social interactions and language skills (Farmer-Dougan, 1992, 1993; McGee, Almeida, Sulzer-Azaroff, & Feldman, 1992; McGee & Morrier, 1992). McGee et al. (1992) showed an increase in peer interactions using typical preschool girls as peer tutors to improve the language and social skills of preschool boys with autism and autistic-like disorders. Also, improvements in social interactions have been reported when peers were used to teach specific play skills to preschoolers with autism (McGee & Morrier, 1992) and when highly rated peers were paired with preschoolers with language delays or behav-

ioral deficits in a Head Start program (Farmer-Dougan, 1992, 1993).

Thus, incidental teaching has been successful for teaching language skills to children with developmental disabilities via peers, and in improving generalization and maintenance of new skills for both children and adults with mental retardation and autism. Only limited research, however, has extended incidental teaching to social skills or peer training with older participants (cf. Oswald, Lignugaris/Kraft, & West, 1990; Stowitschek, McConaughy, Petross, Salzberg, & Lignugaris/Kraft, 1988). The present study, therefore, used a modified peer-delivered incidental-teaching procedure to teach appropriate requesting behaviors during evening lunch preparation to adults with moderate to severe mental retardation or autism. Data were also collected during dinner to determine whether (a) the use of incidental teaching by peers would generalize when participants were not specifically required to use the procedure; (b) peer learners would show an increase in appropriate requesting as a result of incidental teaching initiated by the peer tutors during the evening meal; and (c) incidental teaching would also result in higher verbalization rates for the peer learners. Finally, data were examined to determine whether observed changes were maintained when the lunch-making training sessions were withdrawn.

METHOD

Participants

Participants included 5 men (aged 19 to 38 years) with mental retardation and 1 man (19 years old) with autism who resided in a local group home for individuals with developmental disabilities and moderate to severe behavior problems. All 6 men had lived in the group home for approximately 1 year at the time the study began, and exhibited a variety of behavioral deficits including a low rate of appropriate requesting during mealtime. Informed consent was obtained from the residents' guardians, or, if the resident did not have a guardian, permission was obtained from both the participant and the residential director.

Three of the residents served as peer tutors, and 3 served as peer learners. Assignment to the learner or tutor category was based on each individual's level of functioning determined by (a) IQ and daily living skills profiles, (b) interviews with the house staff, and (c) observation by the author, who also served as behavioral consultant to the group home. Participants' IQ scores ranged from 33 to 55. Adam, Zeke, and Fred were judged to have higher daily functioning levels, higher rates of verbalizations, and more social interactions with staff members or other residents, and were thus chosen as peer tutors. Mel's IQ test scores were high, but he exhibited very low rates of verbalizations and social interactions. Zeke's IQ score was one of the lowest; however, his daily living skills profiles and rates of verbalizations and social interactions were quite high. The peer tutors were asked to choose a partner with whom to work. Adam chose to work with Dave, Zeke with Ben, and Fred with Mel. Interestingly, all partners were also roommates.

All residents had prior experience with incidental teaching, because it was used by staff during training in daily living skills. In addition, all residents could independently make their own lunches when materials were set out for them.

Setting and Materials

The study took place in the kitchen and dining/family room of the group home. Training and observation sessions were conducted as part of the ongoing schedule of daily activities, according to participants' individual habilitation plans (IHPs). During dinner, two to three staff members and all 6 residents (if at home during the meal) sat at a large table, and food was served family style. The house manager and/or house staff were present during all sessions.

During incidental-teaching sessions, the peer tutor/learner pairs and two staff members stood at a counter in the kitchen. All items required for the next day's lunch were placed on the counter in front of the peer pairs. Furnishings and materials used during the lunch-making teaching sessions and the generalization probes were typical of those found in a group-home setting. Items included prepared

food items (e.g., lunchmeat, mayonnaise, mustard), family-sized servings of dinner items, silverware, kitchen and serving utensils, lunch packaging materials, and clean-up supplies. The lunch-making routine was identical to the typical lunch-making procedure, except for incidental teaching.

Experimental Design

The effects of peer-delivered incidental teaching on the rate of verbalizations and the occurrence of nonprompted incidental teaching during dinner-time sessions were evaluated in a multiple baseline design across the three peer tutor/learner pairs. Experimental conditions included baseline, training of peer-delivered incidental teaching, and a withdrawal phase. Following a minimum of 12 incidental teaching sessions, training was withdrawn for a minimum of 16 sessions. The number of sessions varied slightly across peer pairs because of fluctuations in schedules and vacation or home visits by the residents.

Procedure

Baseline. During the baseline phase, peer tutors and peer learners were observed during dinner sessions. The lunch-making routine was altered such that each peer made lunch with his chosen partner, but neither incidental teaching nor prompting of appropriate requests occurred. Baseline data were collected during a 2-week period, resulting in seven to nine observations.

Training of peer tutors. Training began for all 3 peer tutors after the baseline data were collected but before the incidental-teaching sessions began. Peer tutors were trained to occasion appropriate verbal responses using incidental teaching. During training, Adam, Zeke, and Fred were given verbal instructions for evoking an appropriate request and were prompted to use a prompt card. Five steps were taught to the peer tutors during training: (a) watch for an initiation, (b) remove the desired item, (c) ask for a correct response, (d) wait for a correct response, and (e) reward. An incidental-teaching episode was then modeled for the tutors, and they practiced the steps with each other. Training ses-

sions were conducted until all 3 tutors successfully completed the prompt-card steps on 9 of 10 incidental-teaching trials without staff assistance. Three orientation sessions, each lasting approximately 20 min, were necessary to reach this criterion.

Peer training for incidental teaching. Incidental-teaching sessions were conducted by the author or the group-home recreational therapist for 20 min during the normal lunch-making routine. Individual sessions were held consecutively for the three peer pairs, with the order of each session depending on individual and house schedules.

During the incidental-teaching phase, two lunches were made during each lunch-making session (one each for the learner and tutor), such that every target object could be requested a minimum of twice per session. A minimum of three and a maximum of five target items were identified for the peer tutor before each session. The number of items available each session varied with what was being prepared for lunch that day. Free access was allowed to all other items. An average of three training sessions were given each week; not all residents required lunch for their day program each day, and the need for a lunch the following day changed with individual schedules. The incidental-teaching procedure, described below, was used during each lunch-making session.

Incidental-teaching trials consisted of the peer tutor waiting for an initiation by the peer learner towards one of the target objects. An initiation was defined as the peer learner reaching, vocalizing, touching, or otherwise attempting to gain access to an item. When the learner initiated towards the item, the tutor then touched, held, or moved the desired object out of reach and prompted the learner to verbally request the item. The peer learner was then given the desired item contingent on an appropriate verbal request. For example, Mel initiated towards the mayonnaise by reaching for it. Fred then moved the mayonnaise out of reach and requested Mel to "ask nicely"; Mel received the desired object if he responded "please, mayonnaise." For peer pairs Adam and Dave and Zeke and Ben, appropriate responses consisted of "I want the mayonnaise, please." The appropriate level of verbal

request was determined in consultation with the group-home speech therapy consultant.

Peer tutors were taught to wait approximately 5 s for a spontaneous appropriate verbal response after the learner had initiated to the desired object and the tutor had prevented access to the item. If no response or an inappropriate request was made, the peer tutor prompted, "What do you want?" If no response occurred within approximately 5 s or an incorrect response was given, the peer tutor modeled the appropriate response. The tutor continued this prompt sequence until a correct response was made. If a correct response was not made within 1 min, the author or the recreational consultant instructed the tutor to continue making lunch, and the learner was denied access to the desired object until he began another initiation. Following a correct response, the tutor responded, "Thank you. You may have it," and then gave the desired object to the learner.

Withdrawal of incidental teaching. Following the training sessions, the formal incidental-teaching sessions were withdrawn during the lunch-making routine. Data continued to be collected during the dinnertime routine, as described below. In addition, although the lunch-making routine continued, peer tutor/learner pairs were not always required to make their lunches together, but could choose another partner with whom to work, as house and individual schedules allowed.

Direct Observations and Measurement

Observations were conducted during the evening meal, when incidental teaching was neither required nor explicitly trained, as well as during lunch making. The number of incidental-teaching episodes involving each tutor and verbalization data for learners were obtained from 5-min samples during dinner. Observations were randomized across participants such that no individual was consistently observed first, second, or last. During dinner observations, observer(s) sat to the side of the dining area, usually at the staff desk, while the residents and house staff ate their dinner.

The number of incidental-teaching episodes be-

tween each tutor/learner pair was also recorded during each lunch-making session using 5-min samples collected during baseline, teaching, and withdrawal phases. During these observations, observer(s) sat at a stool at the kitchen counter while the residents and trainer made the lunches.

Observation of incidental teaching. To determine whether tutors were using incidental teaching to prompt appropriate requesting during lunch making or dinner, an independent observer recorded the number of incidental-teaching episodes in a 5-min sample. The number of target initiations, tutor prompts, learner responses, and consequences were recorded. In addition, the observer was instructed to note whether an incidental-teaching episode was successful or unsuccessful (i.e., whether or not the appropriate request was occasioned). Learner responses were not collected separately, because a successful incidental-teaching episode indicated the occurrence of an appropriate response.

Observation of verbalization. A 15-s time-sampling observation during 5-min observation periods was collected during dinner to assess verbalizations by the peer learners. These observations were obtained throughout the duration of the study. The percentage of 15-s intervals in which the peer learner made an appropriate verbalization was recorded, as well as whether the verbalization was (a) appropriate requesting or (b) other spontaneous but appropriate verbalizations. Appropriate verbalizations included any verbalization relating to items or individuals at the table, references to daily activities, or current events. For example, Adam might remark that they went to McDonald's during the adult daily activities class, or Zeke might remark that the residents and staff were using the blue plates during dinner. Inappropriate verbalizations included swearing, yelling, threats, or targeted repetitive statements for a particular resident (e.g., "I like apple pie" or "I love you" for 2 residents). Dinnertime verbalization samples were collected approximately three times each week, with verbalization samples always preceding any incidental-teaching sessions. No samples were obtained during lunch-making sessions.

Interobserver Agreement

All observations were collected by trained undergraduate observers. Interobserver agreement was assessed on 20% of all incidental-teaching and verbalization observations by calculating Cohen's kappa (Bakeman & Gottman, 1989). To score an incidental-teaching episode as an agreement, the observers must have agreed on (a) the order in which an episode occurred, (b) the individuals involved, (c) the item(s) involved, and (d) the prompt and consequence used. The mean kappa value was .93 across the study, with a range for individual sessions of 0 (50% agreement) to 1.0. A kappa value of 0 was obtained during one observation, and occurred when two incidental-teaching episodes were recorded by one observer and one incidental-teaching episode was recorded by the reliability observer. Values of kappa equal to or higher than .7 indicate strong interobserver reliability (Bakeman & Gottman, 1989). The mean kappa value for the verbalization observations was .90 across the study, with a range for individual sessions of 0 (50% agreement) to 1.0. Values of 0 were obtained during five observations (6% of interobserver agreement observations), when one observer scored a single verbalization and the second observer scored either no verbalization or two verbalizations.

RESULTS

Data obtained from the learners and the tutors were analyzed separately to determine whether incidental teaching was effective in increasing the number of initiations or responses during dinner, and whether these increases were maintained during withdrawal. In addition, data obtained from the verbalization samples were examined for an increase in (a) appropriate requesting and (b) verbalizations for both the incidental-teaching and withdrawal phases.

Peer tutors. Figure 1 shows the changes in the number of incidental-teaching episodes over the course of the study. The number of successful episodes prompted by the peer tutor during each

5-min dinner sample (generalization) are presented for the baseline, incidental-teaching, and withdrawal phases. The number of episodes during a 5-min sample taken during lunch-making sessions are also included for the training phase. Adam had only three baseline data points because of multiple absences from the group home during this phase.

The tutors used incidental teaching during the training phase, and these increases were generally maintained during the withdrawal phase (Figure 1). During baseline, little or no incidental teaching occurred. The mean number of episodes of incidental teaching during baseline was 0.33 (range, 0 to 1) for Adam, 0.29 (range, 0 to 1) for Zeke, and 0.22 (range, 0 to 1) for Fred. Incidental-teaching training resulted in a higher number of dinnertime incidental-teaching episodes, with a mean of 2 for Adam (range, 0 to 4), 3.5 for Zeke (range, 0 to 8), and 1.4 for Fred (range, 0 to 3). The increase corresponded to a high number of incidental-teaching episodes during the lunch-making training sessions (for Adam, $M = 5.5$, range, 4 to 7; for Zeke, $M = 6.9$, range, 6 to 11; and for Fred, $M = 4.9$, range, 3 to 6). Levels remained higher than baseline for all 3 peer tutors during the withdrawal phase, although the frequency did decline slightly when compared to the teaching phase ($M = 1.4$, range, 0 to 4 for Adam; $M = 2.6$, range, 1 to 5 for Zeke; and $M = 0.6$, range, 0 to 2 for Fred).

Incorporating peer-delivered incidental teaching into the lunch-making routine also increased the spontaneous use of incidental teaching during dinnertime, when it was neither required nor trained. Informal observations and analysis of the targets of these incidental-teaching episodes suggested that the episodes were directed at residents other than the peer learner who had been paired with a particular peer tutor; the tutors used the teaching procedure with whoever initiated to the tutor for a food or dinner item.

To analyze the exact changes in incidental teaching, the probability of a correct response given an incidental-teaching initiation was compared across phases. The probability of a correct response con-

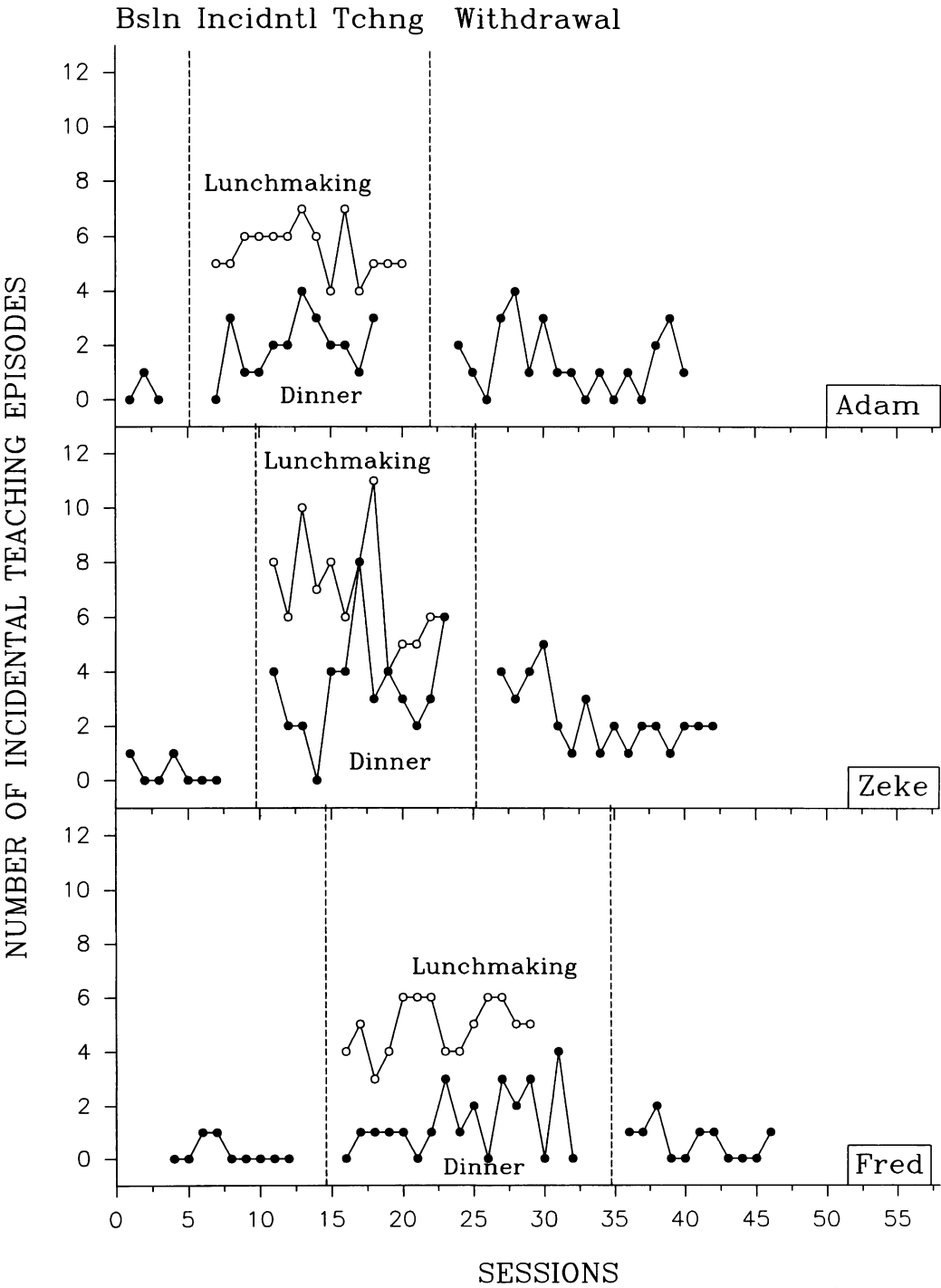


Figure 1. Number of incidental-teaching episodes by the peer tutors during baseline, training, and withdrawal phases.

ditional on an initiation was .5 for Adam, .17 for Zeke, and .33 for Fred during the baseline phase. During incidental teaching, this increased to .96 for Adam, .98 for Zeke, and 1.0 for Fred. Con-

ditional probabilities remained at 1.0 for all 3 participants when training was withdrawn. The data indicate that the participants not only increased the frequency of initiations and incidental-teaching ep-

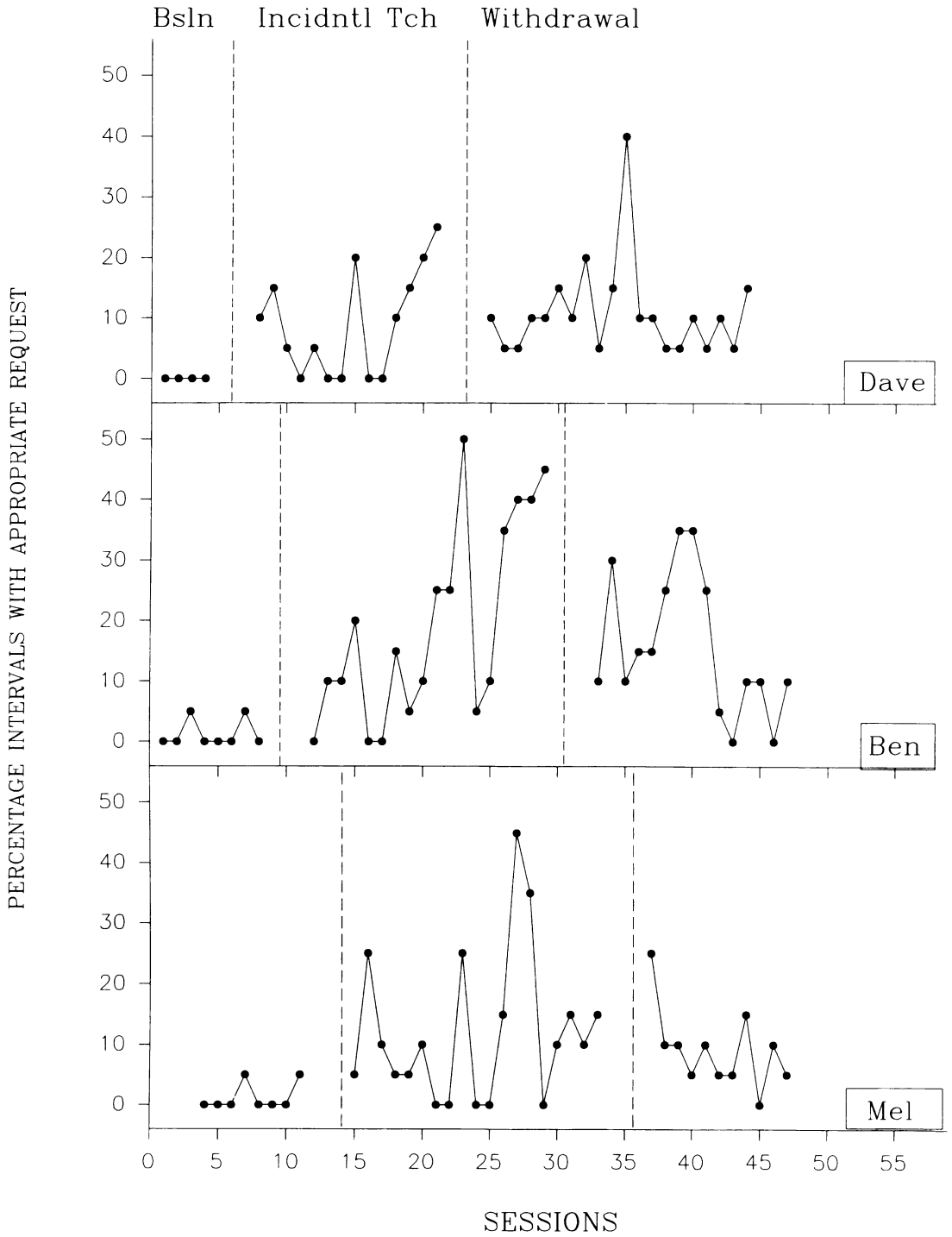


Figure 2. Percentage intervals of appropriate requests by the peer learners during baseline, training, and withdrawal phases.

isodes during dinner, but their attempts were met with a much higher percentage of successful, correct responses during the training phase. These newly learned behaviors were maintained when training sessions were withdrawn.

The data for incidental-teaching interactions were also analyzed to determine whether the individuals with whom the tutors conducted teaching episodes changed across phases. Given that a teaching episode occurred, the probability that the episode was initiated to (a) the paired peer learner, (b) other residents, and (c) staff was determined.

During the baseline phase, Adam and Zeke showed only a very low probability of initiating to their paired peer learner (.01 for both). In contrast, Fred showed a higher probability of initiations (.3) to his paired peer learner. During training, initiations to the target peer greatly increased for Adam (.3) and Zeke (.1), but decreased to .13 for Fred. The probability of an initiation to the paired peer decreased slightly for Adam during withdrawal (.14), increased for Zeke (.22), and remained the same for Fred (.13). Interestingly, during incidental teaching, the probability of an initiation to other peers increased over baseline for Adam (.05 to .67) and Fred (.17 to .75) but decreased for Zeke (.83 to .73). The probability of interactions with other peers continued to increase during withdrawal for Adam (.75) and Fred (.86) but continued to decrease for Zeke (.59).

The probability of an initiation to staff decreased from a high of .5 to .04 for Adam, and from .5 to .13 for Fred during incidental teaching. The probability of initiations increased slightly during the withdrawal to .14 for both Adam and Fred. Zeke, however, showed a rather flat profile across all phases of the study (.17, .17, and .19 for baseline, incidental teaching, and withdrawal, respectively).

Peer learners. Figure 2 plots the percentage of appropriate requesting during dinnertime probes for the peer learners. Appropriate requesting by the peer learners followed a pattern similar to that shown for incidental-teaching episodes for the peer tutors. Appropriate requesting at dinner was very low to absent in all 3 learners during baseline; Dave

showed 0% appropriate requests, and both Ben and Mel showed a mean of 1.3% (range, 0% to 5%). An increasing trend was found for all 3 learners during the incidental-teaching phase ($M = 8.9\%$ for Dave, range, 0% to 20%; $M = 19.2\%$ for Ben, range, 0% to 45%; and for Mel, $M = 12.1\%$, range, 0% to 45%). This increase was maintained during the withdrawal phase, especially for Dave ($M = 11\%$, range, 5% to 40%). A slight decrease occurred for Ben and Mel during the withdrawal condition ($M = 16.8\%$ for Ben, range, 0% to 35%; and $M = 9.1\%$, range, 0% to 25% for Mel), but verbalizations remained much higher than during baseline.

Figure 3 shows the percentage of intervals of general verbalizations for the learners across all phases of the study. Appropriate requesting is not included in these percentages. The peer learners demonstrated very few verbalizations during baseline ($M = 12.5\%$, range, 5% to 30%; $M = 10\%$, range, 0% to 25%; and $M = 1.4\%$, range, 0% to 5% for Dave, Ben, and Mel, respectively). Overall verbalizations increased during the initial incidental-teaching phase, even though the incidental-teaching contingency required only the specific appropriate requesting verbalization. Dave increased his verbalizations to a mean of 17.9% (range, 5% to 25%); Ben increased his to a mean of 38.9% (range, 5% to 50%); and Mel increased his to a mean of 25.4% (range, 0% to 65%). This increase was maintained during the withdrawal phase for Dave ($M = 28.2\%$, range, 5% to 45%). Mel's and Ben's overall verbalizations in the withdrawal phase remained higher than during baseline, yet they showed a decrease in overall verbalizations during the withdrawal condition ($M = 12.3\%$, range, 0% to 25%, and $M = 28.2\%$, range, 5% to 45%, respectively).

DISCUSSION

Peer-delivered incidental teaching proved to be a highly effective intervention for increasing appropriate requesting. Generalization was obtained, changes in the probability of initiations to staff and peers were found, and the increased interaction be-

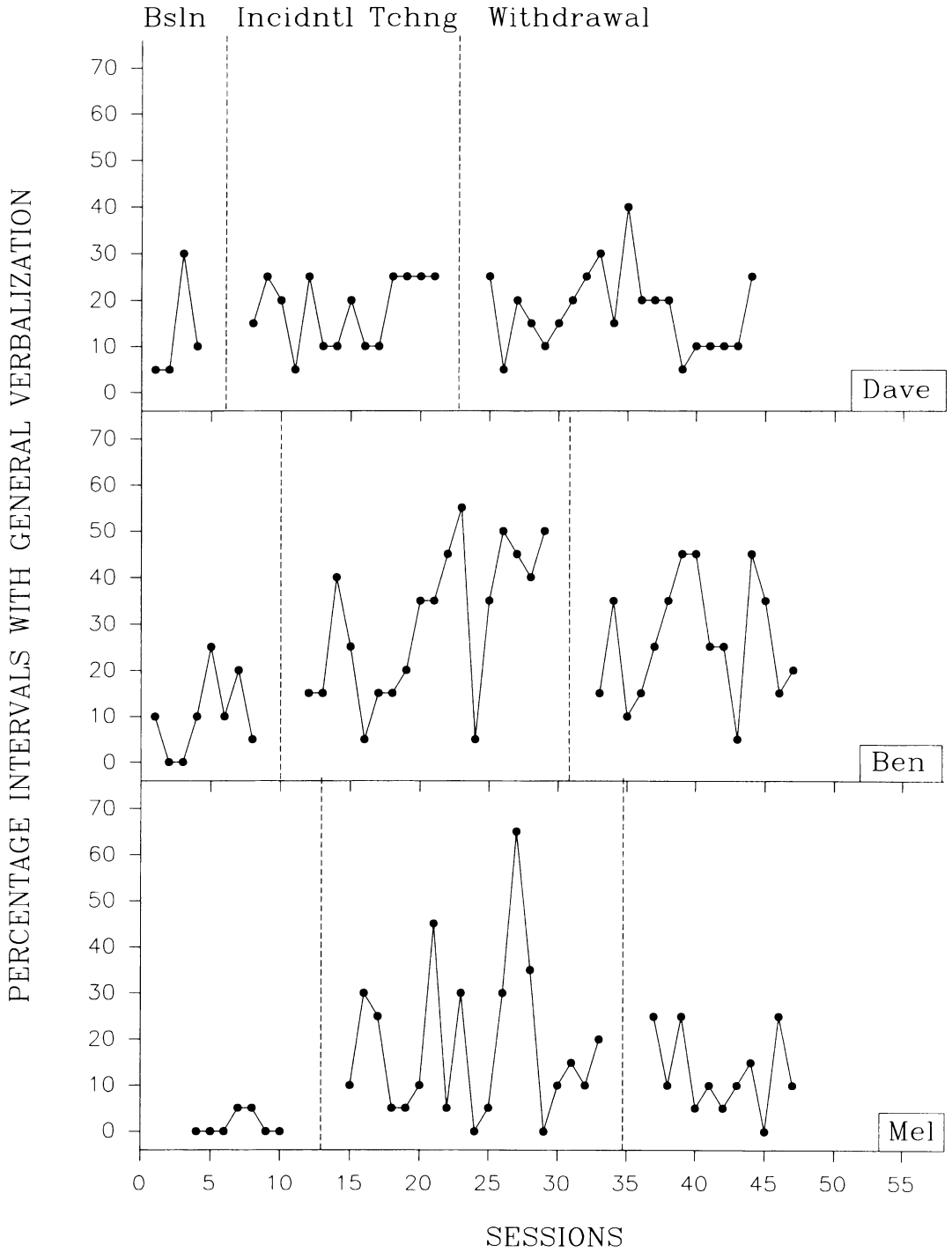


Figure 3. Percentage intervals of overall verbalizations by the peer learners during baseline, training, and withdrawal phases.

tween the residents was maintained when the program was withdrawn. Peer tutors used the prompt sequence during dinner, although training did not occur in this setting. The peer tutors initiated to individuals other than their paired peer in the absence of explicit training, and peer learners increased the frequency of both appropriate requesting and overall verbalizations during the training phase. These increases were maintained when the teaching phase was withdrawn.

The participants' use of incidental teaching during dinner, although training occurred during lunch making, is not surprising. Similar generalization effects have been widely noted when using incidental-teaching procedures (e.g., Farmer-Dougan, 1992; Hart & Risley, 1980; McGee et al., 1983, 1992; Warren & Kaiser, 1986), and one consistent result of incidental teaching appears to be improved maintenance and generalization. As indicated by data from the present study, this effect may be augmented when peer tutoring is used. That is, use of peer-delivered incidental teaching may have resulted in reinforcement of a general class of verbal interactions between the residents, as well as specific verbalizations.

Behavioral trapping may provide some explanation for this result. Behavioral trapping describes the process by which newly acquired behaviors come under the control of naturally occurring reinforcement (McConnell, Sisson, Cort, & Strain, 1991; Stokes & Baer, 1977). Behavioral trapping may have occurred during the training and withdrawal phases when the set of newly learned verbal and social behaviors (e.g., initiating to a peer, appropriate requesting of an item) were reinforced by a related set of verbal and social behaviors (e.g., getting access to the desired item, verbal interactions). In turn, these new behaviors may have been reinforced by other interaction patterns as the peers engaged in increasing numbers of social interactions.

Changes in the probability of initiations help to support this argument. During baseline, 2 tutors (Adam and Fred) initiated to staff during approximately half of all incidental-teaching episodes, whereas during incidental teaching, initiations to

staff decreased to nearly zero. In contrast, the proportion of interactions that occurred with peers greatly increased during the training phase for both peers. Initiations to staff increased only slightly for these 2 residents, and the probability of an initiation to residents remained high even during the withdrawal phase. This indicated that the training produced a long-term change in participants' interactions with staff and peers. Although Zeke did not show a similar change in initiations to staff, he did show similar changes in initiations towards his peers. Informal observation and daily living profiles indicated that Zeke was the more social of the residents, and data indicated a higher level of interactions with peers and a lower level of interactions with staff during baseline. Thus, the results may indicate a floor or ceiling effect for Zeke, rather than a failure to change interactions.

Informal observations also suggested that the increase in peer interactions was not necessarily the result of access to items alone. Rather, it appeared that the peers began to use the incidental-teaching episodes as a form of social interaction. On several occasions, peer learners prompted peer tutors to begin an incidental-teaching episode. For example, both Dave and Ben attempted to begin an episode by tapping their peer on the hand and pointing to an item. The peer would then begin the verbal prompt, and Dave or Ben would request the item appropriately. However, this also occasionally resulted in inappropriate attempts at social interaction: After gaining access to the item via incidental teaching, Ben and Dave would immediately pass the item on to the person next to them. Apparently, incidental teaching provided residents with a means to positively interact with one another in a social setting in addition to the reinforcement gained by access to the food or table item. As a result, the attention and praise gained when using appropriate requests may have become a more potent reinforcer than the item itself, but they also established reinforcement of new, but somewhat inappropriate, attempts at social interaction.

Given the success of incidental teaching in the present study, three reasons for using incidental teaching emerge. First, peer-delivered incidental

teaching was relatively easy to implement and highly adaptable, because of a focus on naturally occurring situations rather than constrained stimulus settings. Second, incidental teaching proved to be a highly appropriate procedure for a community-based program, because it provided a context of natural, family-like activities paired with instruction and treatment. Such an approach "can be an invaluable tool, because it maximizes the amount of instruction by teaching language skills while simultaneously shaping other necessary home-living skills" (McGee et al., 1983, p. 330).

Finally, in addition to ease and adaptability, incidental teaching provided a more effective means of assessing what was reinforcing to the target individuals. As McConnell et al. (1991) and Timberlake and Farmer-Dougan (1991) have noted, programs or procedures that use artificial or complex reinforcers are highly unlikely to maintain responses when training is faded or withdrawn, and are unlikely to produce high degrees of response generalization.

Although the results of the present study are quite encouraging, continued examination of reinforcement and generalization effects created by incidental teaching procedures should be examined further. Research investigating the exact nature of the contingencies required to produce reinforcement effects and analysis of training procedures that best produce generalization should be pursued. Incidental teaching greatly increases the efficacy of natural reinforcement settings. If incidental teaching is to be used to its greatest potential, then its underlying mechanisms, and the resulting implications for applied settings, must be thoroughly investigated.

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